UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/600,654	06/23/2003	Byung-Cheol Song	1293.1765	6145

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STAAS & HALSEY LLP
SUITE 700
1201 NEW YORK AVENUE, N.W.
WASHINGTON, DC 20005

EXAMINER
HUNG, YUBIN

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

PTOL-90A (Rev. 04/07)

	Application No.	Applicant(s)
Office Action Summary	10/600,654	SONG ET AL.
	Examiner	Art Unit	
	Yubin Hung	2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☒ Responsive to communication(s) filed on <u>12 April 2007</u>.

2a) ☒ This action is **FINAL**.   2b) ☐ This action is non-final.

3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) <u>1-58</u> is/are pending in the application.

     4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5) ☒ Claim(s) <u>10-19, 29-38 and 48-58</u> is/are allowed.

6) ☒ Claim(s) <u>1,2,4,6,7,20,21,23,25,26,39,40,42,44 and 45</u> is/are rejected.

7) ☒ Claim(s) <u>3,5,8,9,22,24,27,28,41,43,46 and 47</u> is/are objected to.

8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) ☐ The specification is objected to by the Examiner.

10) ☒ The drawing(s) filed on <u>12 April 2007</u> is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.

     Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

     Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

     a) ☒ All   b) ☐ Some *   c) ☐ None of:

       1. ☒ Certified copies of the priority documents have been received.

       2. ☐ Certified copies of the priority documents have been received in Application No. _____.

       3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

     * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
     Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413)
     Paper No(s)/Mail Date. _____.

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

Response to Amendment/Arguments

1.   This action is in response to amendment filed 04/12/07, which has been entered.

2.   Claims 1-58 are still pending.

3.   In view of Applicant's amendment, the objection to the drawings has been withdrawn.

4.   In view of Applicant's amendment, the objection to the specification has been withdrawn.

5.   In view of Applicant's amendment, the 35 USC § 112 rejections of claims 10-19 and 48-57 have been withdrawn. [Note that with the change of dependency made to claims 19 and 57, the antecedent basis for "the calculated threshold" now exists (in their respective parent claims 13 and 51) and there is no need to change "the calculated threshold" to "a calculated threshold." Note further that while Applicant states that claim 24 has been amended to depend from claim 23, the actual amendment has not been made.]

6.   In view of Applicant's amendment, claims 10-19 and 48-57 have been allowed

since the 35 USC 112, second paragraph objection to claims 10 and 48 have been

overcome.

7.   Applicant's arguments filed 07/02/04 have been fully considered but they are not

persuasive; see below.

8.   In remarks Applicant argued in substance:

Regarding claims 1, 20 and 39

A.   *that Tan calculates the time of the completion of the decoding while the claimed*

invention uses the amount of decoding performed on previous image data which

is received from a decoder (P. 16, last paragraph) and that Boyce does not

disclose using the decoder complexity information representing an amount of

decoding computation performed on previous images received from a decoder

(P. 17, 1st paragraph)

However, Tan actually discloses calculating the time it takes to complete the

decoding (i.e., the amount of decoding) of a previous image and feeding the

information back to the encoder [Fig. 12, refs. 301 and 302; Col. 9, lines 18-20,

26-27 and 38-42] to encode the current image. While ref. 302 is a simulator of

the decoder, Boyce was relied upon in the rejection to teach using information

fed back from a decoder (e.g., the amount of decoding computation as taught by

Tan) to control compression. (Boyce was not relied upon to teach that the

complexity information represents an amount of decoding computation.)

Therefore the argument is not persuasive.

B.   *that (with respect to the APA) the decoder cannot properly encode (sic) the*

received bit stream or make full use of the allocated computation amount; that a

fixed, predetermined threshold value is used; and that the varying complexity of

DCT computation from block to block is not considered (P. 17, 1st paragraph)

However, as per the analysis of claims 1, 20 and 39, the APA is modified by the

teachings of Boyce and Tan specifically to overcome the deficiencies recited

above by feeding back decoding complexity (in terms of the amount of encoding)

to the encoder to control the skipping of DCT operations on the current image, in

addition to using the sum of absolute difference (SAD) and the quantization

coefficient (Q) [Fig. 2, refs. 210, 220, 270, 280 and paragraphs 6, 12 and 13 of

the instance invention]. Therefore the argument is not persuasive.

Claim Rejections - 35 USC § 103

(From Office action mailed 01/12/07)

9.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set
> forth in section 102 of this title, if the differences between the subject matter sought to be patented and
> the prior art are such that the subject matter as a whole would have been obvious at the time the
> invention was made to a person having ordinary skill in the art to which said subject matter pertains.
> Patentability shall not be negatived by the manner in which the invention was made.

10.   Claims 1, 2, 4, 6, 7, 20, 21, 23, 25, 26, 39, 40, 42, 44 and 45 are rejected under

35 U.S.C. 103(a) as being unpatentable over APA (Admitted Prior Art of Fig. 2 and

paragraphs 12 & 13 on page 2 of the instance application), and further in view of Boyce

et al. (US 5,825,927) and Tan et al. (US 6,542,549).

11.   Regarding claim 1, and similarly claim 39, APA discloses a method for controlling

the DCT computation amount that

- receiving *complexity information* on previous image data
  [Fig. 2, refs. 220, 270 & 280 (receiving complexity information from 220
  & 270); P. 2, paragraph 13, lines 1-4. Note that the outputs from 220
  and 270 constitute complexity information]
- controlling a skipping of DCT operations on current image data based on
  the received *complexity information*
  [Fig. 2, refs. 210 & 280; P. 2, paragraph 13]

APA does not expressly disclose that the complexity information is decoder

complexity information that represents an amount of decoding computation performed

on previous image data.

However, Boyce discloses using information feedback from a decoder as a control signal for the compression circuit [Fig. 7, refs. 701 (decoder) & 712 (compression circuit); Col. 6, lines 27-29 & 39-46. Note that skipping DCT computation as disclosed in APA is a form of compression control.]

In addition, Tan discloses using the amount of decoding computation performed on previous image data as feedback information. [For the feeding-back, see Fig. 12, refs. 301 & 302 (feeding back complexity information from VCV 302 to encoder 301), as well as Fig. 18, refs. 601 (Macroblock Type Decision), 611& 612 (showing VCV 612 feeding back complexity information that controls Macroblock Type Decision at 601) and Col. 11, lines 8-13. Note that Col. 9, lines 9-42, especially 18-20, 26-27 and 38-42, describe how VCV determines the amount of decoding computation complexity (as performed on previous image data, see lines 28-34). Note further that Fig. 8, ref. 804 (Virtual Decoder Model) shows that the VCV models the decoder (see also Col. 9, lines 15-17). Note further still that Fig. 2, ref. 201 (Macroblock Type Decision) and Col. 2, lines 1-4 describe how Macroblock Type Decision (also shown in Fig. 18 as ref. 601) controls macroblock encoding decisions, of which skipping the DCT operation, as disclosed in the APA, can certainly be one.]

APA, Boyce and Tan are combinable because they all have aspects that are from the same field of endeavor of encoding.

At the time of the invention, it would have been obvious to one of ordinary skill in

the art to modify APA with the teachings of Boyce and Tan by using the decoding

computation complexity information fed back from the decoder to control the encoding

process (such as skipping DCT computation). The motivation would have been to allow

the decoder to deal with unpredictable worst-case encoded bitstream (as indicated by

Boyce in Col. 6, lines 48-51), as well as to accurately constraint the resource

requirement in the decoder (as Tan indicates in Col. 3, lines 30-34 & 40-52).

Therefore it would have been obvious to combine Boyce and Tan with APA to

obtain the invention as specified in claim 1.

12.   Regarding claim 20, note that APA further discloses a DCT computation amount

controller [Fig. 2, ref. 280] which, as modified by the teachings of Boyce and Tan as set

forth above will control skipping of DCT operations using decoder computational

complexity [per the analysis of claim 1]; Fig. 2, ref. 210 and P. 2, paragraph 13 further

discloses a DCT unit under the control of the controller. Therefore claim 20 is obvious

and is accordingly rejected.

13.   Regarding claim 2, and similarly claims 21 and 40, Tan further discloses

- wherein the receiving decoder complexity information further comprises
  calculating the decoder complexity information which represents the
  amount of decoding computation performed on previous image data
  [Fig. 12, ref. 302 (feeding back complexity information to encoder 301)
  and Col. 9, lines 9-42, especially 18-20, 26-27 and 38-42, which
  describe how VCV calculates the amount of decoding computation
  complexity, as performed on previous image data (see lines 28-34).

Note further that Fig. 8, ref. 804 (Virtual Decoder Model) shows that
the VCV models the decoder; see also Fig. 12, ref. 305 and Col. 9,
lines 15-17.]

14.   Regarding claim 4, and similarly claims 23 and 42, Tan further discloses

- wherein the decoder complexity information includes information on a
  decoder computation amount allowed for the previous image data
  [Col. 11, lines 9-12. Note that the defined bound against the
  complexity is checked is considered the allowed decoder computation
  complexity
- information on a decoder computation amount actually consumed for the
  previous image data
  [Per the analysis of claim 1. Note that as set forth in that analysis,
  the combined invention of APA, Boyce and Tan discloses a method in which
  the actual decoder information for the previous image data is provided
  to the encoder (as taught by Boyce in Fig. 7, refs. 701 & 712 and Col.
  6, lines 27-29 & 39-46) and, as taught by Tan (Col. 9, lines 9-42,
  especially 18-20, 26-27 and 38-42), the feedback information is the
  decoder complexity representing computation amount]

15.   Regarding claim 6, and similarly claims 25 and 44, Tan further discloses

- wherein the previous image data are a predetermined number of previous
  frames, and the current image data is a frame being currently encoded
  [Col. 9, lines 28-34 (i.e., the number of previous pictures to be
  decoded, or the size of the previous image data, is one); Col. 11, lines
  9-12 (since the decision is made on a per-macroblock basis, the current
  image data is the frame that contains the macroblock being encoded
  (therefore the frame per se is being encoded)]

16.   Regarding claim 7, and similarly claims 26 and 45, APA further discloses

- wherein a DCT operation on the current image data is executed or skipped
  in the currently-encoded frame on a block-by-block basis
  [Fig. 2, ref. 210; P. 2, paragraph 13, lines 3-4]

Allowable Subject Matter

17.   Claims 10-19, 29-38 and 48-58 are allowed.

18.   Claims 3, 5, 8, 9, 22, 24, 27, 28, 41, 43, 46 and 47 are objected to as being

dependent upon a rejected base claim, but would be allowable if rewritten in

independent form including all of the limitations of the base claim and any intervening

claims.

19.   The following is a statement of reasons for the indication of allowable subject

matter:

A.   Regarding claim 3, and similarly claims 22 and 41,the combined invention of

APA, Boyce and Tan discloses all limitations of its parent, claim 1. APA further

discloses calculating a threshold value and using it to control the skipping of DCT

operations [Fig. 2, ref. 280 and P. 2, paragraph 13, lines 1-4]. Tan further discloses

comparing the complexity with a defined bound (i.e., threshold) to make encoding

decision [Col. 11, lines 9-13]. Lin et al. (US 6,748,019) also discloses using a threshold

to determine whether DCT operations should be skipped [Fig. 3; Col. 2, lines 30-34].

However, none of the recited references, alone or in combination, disclose, teach or

suggest calculating a target DCT computation amount for the current image data using

the received decoder complexity information and using it to calculate the threshold for

DCT skipping decision.

B.   Regarding claim 5, and similarly claims 24 and 43, closest art of record APA,

Boyce, Tan and Lin, alone or in combination, do not disclose, teach or suggest including

the ratio recited in the claim as part of the decoder complexity information.

C.   Regarding claim 10, and similarly claims 29, 48 and 58, per the analysis of claim

1, the combined invention of APA, Boyce and Tan discloses the limitations regarding

the receiving of decoder complexity information for DCT skipping control. APA further

discloses the use of SAD (which is not a variation of the motion estimator (ME)

computation amount) in the DCT skipping control [Fig. 2, refs. 270 & 280; P. 2,

paragraph 13].

In addition, Gonzales et al. (US 5,231,484) discloses using the outputs from the

ME for rate control [Fig. 11, refs. 14 & 15; Col. 15, line 39-Col. 20, line 36]; Elbaz et al.

(US 6,757,005) discloses using the motion vectors and their associate quality factor to

decide whether the encoding of a macroblock should be skipped [Fig. 4, refs. 180, 410,

420, 450 & 460; Col. 8, lines 13-41]; and Kim et al. (US 2002/0118746) discloses using

sum of absolute difference (SAD) from the ME for rate control [P. 2, equation 1 and

paragraphs 21, 22 & 25].

However, none of the references cited above, alone or in combination, disclose, teach or suggest using ME computation amount variation information in determining whether to skip DCT operations on current image data.

Conclusion and Contact Information

20. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a). A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

21. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Yubin Hung whose telephone number is (571) 272-7451. The examiner can normally be reached on 7:30 - 4:00. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew C. Bella

can be reached on (571) 272-7778. The fax phone number for the organization where

this application or proceeding is assigned is 571-273-8300.

22.   Information regarding the status of an application may be obtained from the

Patent Application Information Retrieval (PAIR) system. Status information for

published applications may be obtained from either Private PAIR or Public PAIR.

Status information for unpublished applications is available through Private PAIR only.

For more information about the PAIR system, see http://pair-direct.uspto.gov. Should

you have questions on access to the Private PAIR system, contact the Electronic

Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a

USPTO Customer Service Representative or access to the automated information

system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

                                    Yubin Hung
                                    Patent Examiner
                                    Art Unit 2624

                                    July 2, 2007
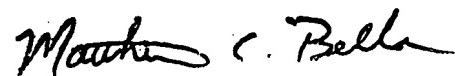
                                    MATTHEW C. BELLA
                              SUPERVISORY PATENT EXAMINER
                                 TECHNOLOGY CENTER 2600